

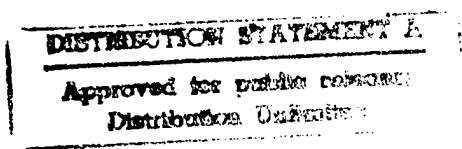
EXECUTIVE SUMMARY
OF
ENERGY SAVING OPPORTUNITY SURVEY
(ESOS)
FOR
INDIANA ARMY AMMUNITION PLANT
CHARLESTOWN, INDIANA

ICI AMERICAS, INC.
OPERATING CONTRACTOR

LOUISVILLE DISTRICT
U.S. ARMY CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

Prepared By:
CHRISMAN, MILLER, WOODFORD, INC.
LEXINGTON, KENTUCKY
1986

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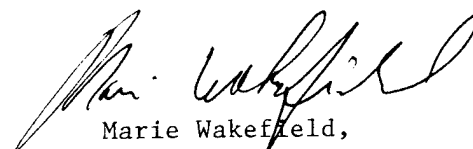


DEPARTMENT OF THE ARMY
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS
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Marie Wakefield,
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The Indiana Army Ammunition Plant in Charlestown, Indiana completed FY1985 with an energy use reduction of 8.5% from FY1984, surpassing the 8.1% goal. The 10-Year Energy Use Reduction Goal (Base Year FY1975) of 32.3% was achieved and surpassed in FY1985 with a 10-year reduction of 32.5%. This reduction occurred while increasing the plant's staff by 15% and production by 28%.

The energy conservation efforts at INAAP during FY1985 resulted in cost avoidances of \$917,685 for base year FY1985 and \$175,879 from FY1984. For these remarkable efforts, the plant has received numerous awards including the USDOE Federal Energy Efficiency Award, the DoD Installation Award, and the Contractor, ICI Americans, Inc. has received the Association of Energy Engineers Corporate Energy Management Award.

The achievement of these energy reductions had occurred by implementing a high priority action-oriented task plan utilizing short term and long term facility retrofit projects as well as people oriented programs and incentives.

It was in the continuing effort of this program that Chrisman, Miller, Woodford, Inc. of Lexington, Kentucky was selected in the Fall of 1985 to conduct an Energy Saving Opportunity Survey (ESOS) of all active buildings on the plant. CMW, well known for its energy conservation work, was familiar with the plant due to its design of the FY85 ECAM projects.

The task of conducting an effective ESOS study at the plant would be a difficult one due to the effective conservation efforts already implemented. However, the Scope of Work developed by the plant in conjunction with the Louisville District, U.S. Army Corps of Engineers, gave the following charge:

1. Review for general information the previously completed Energy Engineering Analysis Program (EEAP) study and any other energy studies which were performed at the installation.
2. Evaluate selected ECOs to determine their energy savings potential and economic feasibility.
3. Perform a site survey of selected buildings or areas to insure that any new methods of energy conservation which are practical and have not been evaluated in any previous energy study have been considered and the results documented.
4. Prepare a comprehensive report to document the work performed, the results and the recommendations.

Two hundred forty-eight (248) active buildings were identified for inclusion in the survey. A complete listing can be found in Appendix A of this executive summary.

In addition to the general scope of work for the ESOS study, scope of work is located in Special Study Number 9, Volume 3, Book 2), ten highly specific "special studies" were included to assure

all aspects and potentials were evaluated. The Special Studies include:

1. 1500 Area Steam Distribution System Study
2. Load and Igniter Line Compressed Air System Study
3. Load Line Five Heating and Cooling System Study
4. Propellant and Explosives Area Water Supply System Study
5. Electrical Demand and Power Factor Correction Study
6. Hydroelectric Power Development Potential
7. Exit Lighting Replacement Study
8. Alternate Energy Development Potential
9. Development of Computer Based Analysis Program
10. Aerial Infrared Roof Scan

It was decided after many hours of discussion with plant and Corps personnel that the ESOS study would basically be accomplished (except for the Special Studies) within the context of the Computer Analysis. The program is described in detail in Special Study nine but a brief discussion is necessary here in order to understand the report formatting.

The program is divided into several parts. First is the data base consisting of all individual building parameters filed by building number. Second is the actual energy computation section which, utilizing information from the data base models energy consumption and calculates savings for forty-four preselected retrofit options. Part three is the life cycle cost analysis section based on Energy Conservation Investment Program (ECIP) guidance.

The program will model, integrate, manipulate and retrieve all data in a user friendly manner. Software is provided on 360K double-sided, double density, soft-sectored floppy diskettes. The program is IBM compatible and requires no other interactive software. The computer program utilizes standard mathematical algorithms to model energy usage.

It is important to note here that each building was surveyed individually and treated as a discrete entity. The building energy use program models each building individually and all calculation procedures are computed using each building's physical data and characteristics. No "broad brush" guidelines are applied to dissimilar buildings. All calculation procedures are described in detail in the Methodology section of this report. The costs involved in each recommended ECO were also computed individually.

However, some "per unit" costs were utilized, such as cost per square foot for batt type insulation.

With this in mind, the study is formatted into three main volumes plus the executive summary volume. Volume I consists of all field data collected. It is in a standard form format and arranged by building number. Volume II consists of the computer analysis of each building and the associated LCCA's. Volume III contains the special studies.

The survey began with the selection of a team to conduct the study. Following is a listing of key team members:

Jerry A. Taylor, A.I.A., P.E., C.E.M.
Project Director

John Zachem, P.E., C.E.M.
Mechanical Engineer/Computer Programmer

Jim Wade, P.E.
Mechanical Engineer

Bob Kaiser, P.E., C.E.M.
Mechanical Engineer

Don Buehler, P.E.
Electrical Engineer

Charles Milward, P.E.
Civil Engineer/Hydraulics

Kerry Odle, P.E.
Civil Engineer/Hydraulics

Brian Hill, A.S.L.A.
Landscape Architect

Gary Griffin
Energy Technician/Computer/Field Investigation

Roberta Tanno
Energy Technician/Field Investigation

Rick Kilekamp
Energy Technician/Field Investigation

Terry Thompson
Computer Programmer

Dan Hill, P.E.
Hydroelectric Engineer

Mike Palmer
Infrared Scan Technician

Site Investigation began with review of available building drawings and compilation of schedule/occupancy data obtained from plant personnel. Following this phase, each building was surveyed in the field by two - two man teams. Standard data was gathered as well as any unique information. This data was transformed to building survey data forms (Volume I) and subsequently to the computer program. Each form and building was further reviewed in the field by the Project Director and the teams head mechanical engineer.

After all field data was collected, reviewed and input to the computer program, ECOs for study were selected and the program run for each building. Those with favorable energy savings were then analyzed by the computer under ECIP economic criteria.

Following review of the preliminary results, it was decided to group the feasible ECO's by several categories:

Category One - Savings to Investment Ratio (SIR)

SIR > 1 < 3
SIR > 3

Category Two - Implementation Cost

Cost < \$1000
Cost > \$1000 < \$5000
Cost > \$5000

Category Three - Area

Area 1 = P & E
Area 2 = LAP
Area 3 = INERT
Area 4 = Administration
Area 5 = Residences

Category Five - ECO Type

A - Insulation
B - Boilers
C - Lighting
D - Windows/Door
E - Landscaping
F - HVAC Controls
G - HVAC Equipment
H - High Efficiency Motors
I - Lower DHW Temperature
J - Domestic Hot Water
K - Solar

These categories, which are further detailed later in this summary, produce a potential for 220 project groupings.

To summarize the results we will break them into groups only by SIR and Cost. (The listing of each of the individual groups is included in this volume as an appendage; index 6 - individual group summary. Group 1 consists of all projects with a savings-to-investment ratio (SIR) greater than or equal to three and an implementation cost greater than \$5,000.00. Group 2 consists of all projects with a savings-to-investment ratio (SIR) greater than or equal to three and an implementation cost greater than \$1,000.00 but less than \$5,000.00. Group 3 consists of all projects with a savings-to-investment ratio (SIR) greater than or equal to one, but less than three, and a construction cost greater than \$5,000.00. Group 4 consists of all projects with a savings-to-investment ratio (SIR) greater than or equal to one, but less than three and a construction cost greater than \$1,000.00 but less than \$5,000.00.

For all projects with an SIR greater than three and a cost greater than \$5000, (Group 1) we show a savings of 41012 MBTU of energy, a cost avoidance of \$228,818 at a total investment of \$553,960. This has a simple amortization period of 2.42 years.

For all projects with an SIR greater than three and costing greater than \$1000 but less than \$5000, (Group 2) we show a savings of 51,142 MBTU, a cost avoidance of \$332,192 at a total investment of \$325,353. This has a simple amortization period of 0.98 years.

This gives a grand total for all SIR's above three, an energy reduction of 92154 MBTU, a cost avoidance of \$561,010, at a total investment of \$879,313. This has a simple amortization period of 1.57 years.

In the period from November 1, 1985 to October 31, 1986, the plant consumed (in heating and cooling buildings) 321,734 MBTU at a cost of \$3,511,046. If all projects with SIR's greater than three were implemented, it would produce a reduction in energy useage of 28.6% and a cost reduction of 16%.

For projects with an SIR greater than one and less than three and a cost greater than \$5000, (Group 3) we show energy savings of 27427 MBTU's and a cost avoidance of \$159,055, at a total cost of \$1,462,877. This has a simple amortization period of 9.20 years.

For projects with an SIR greater than one and less than three and a cost greater than \$1000 but less than \$5000, (Group 4) we show savings of 5349 MBTU, a cost avoidance of \$34,169, at a total investment of \$287,237. This has a simple amortization period of 8.41 years.

This gives a grand total for all SIR's greater than one and less than three of 32,776 MBTU, a cost avoidance of \$193,224, at a total investment of \$1,750,114. This has a simple amortization period of 9.06 years. This gives reductions from the base year in energy and cost of 10.2% and 5.5%.

If all SIR's greater than one are now combined, we have energy savings of 124,930 MBTU, a cost avoidance of \$754,234, at a total investment of \$2,629,427. This has a simple amortization period of 3.49 years. This represents a reduction of 38.8% in energy use and 21.5% in costs.

Another significant group includes "overhead" projects. These are projects with an SIR greater than one but a cost less than \$1000 (Listed at index tab 6 - individual group summary). These projects save 25140 MBTU's, have a cost avoidance of \$266,841, at a total investment of \$187,088. This has a simple amortization period of 0.70 years.

If this same "overhead" project is restricted to the residential areas, the savings amount to 8874 MBTU, a cost avoidance of \$54,970 at a total investment of \$56,026. These have a simple amortization period of 1.02 years.

If all the ECO's with an SIR greater than one are implemented, regardless of cost, we have a total reduction of 133,804 MBTU, a cost avoidance of \$1,021,075, at a total investment of \$2,816,515. This has a simple amortization period of 2.76 years. The total reduction in energy and cost amount to 41.6% and 29.1%.

All of these groupings are included in greater detail following this summary.

The special studies also represent significant energy savings. These can be summarized as follows:

SPECIAL STUDIES SUMMARY

SPECIAL STUDY NO.	SAVINGS MBTU OIL	SAVINGS DOLLARS OIL	SAVINGS MBTU ELECT	SAVINGS DOLLARS ELECT	SIR	TOTAL INVEST- MENT	AMORTIZATION
1. 1500 AREA DIST. STEAM	13,218	68,734	0	0	2.3	494,249	7.19
2. LOAD & IGNIT. COMP. AIR	0	0	379	5,679	2.85	22,389	3.94
3. LOAD LINE 5 HVAC	3382	18,709	247	3,691	1.62	149,818	6.69
4. P&E WATER	0	0	1,197	17,880	1.09	143,560	8.03

SPECIAL STUDY NO.	SAVINGS MBTU OIL	SAVINGS DOLLARS OIL	SAVINGS MBTU ELECT	SAVINGS DOLLARS ELECT	SIR	TOTAL INVEST- MENT	AMORTIZATION
5. ELECT. DEMAND & POWER FACTOR							
							NOT APPLICABLE
6. HYDRO POWER							
							DID NOT QUALIFY
7. EXIT LIGHTS	0	0	114	1,710	1.34	2,128	1.24
8. ALT. ENERGY	0	0	1,054	15,808	1.54	89,772	5.68
9. N/A							
10. N/A							
TOTALS:	16,600	87,443	2,986	44,768	1.51	901,916	

SIMPLE AMORTIZATION PERIOD = 6.82 YEARS

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION AND MANAGEMENT PROGRAM (ECAM)

LOCATION: I.N.A.A.P. REGION NO.: 5 PROJECT NUMBER:
715330-51 (SS SUMMARY)
PROJECT TITLE: ENERGY SAVING OPPORTUNITY SURVEY FISCAL YEAR: 91
DISCRETE PORTION NAME: SPECIAL STUDIES SUMMARY B:SUMMARY.XSP
ANALYSIS DATE: 12/86 ECONOMIC LIFE: 15 PREPARED BY: CMW & KT ASSOC.

1. INVESTMENT

A. CONSTRUCTION COST	\$901,916.00
B. SIOH (1A * 5.5%)	\$49,605.38
C. DESIGN COST (1A * 6%)	\$54,114.96
D. ENERGY CREDIT CALC (1A+1B+1C) * 90%	\$905,072.60
E. SALVAGE VALUE	\$0.00
F. TOTAL INVESTMENT (1D-1E)	\$905,072.60

2. ENERGY SAVINGS (+) / COST (-)

BASE YEAR ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

	UNIT COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED
FUEL	\$/MBTU(1)	MBTU/YR(2)	SAVINGS(3)	FACTOR(4)	SAVINGS(5)
A. ELEC	\$15.00	2,986	\$44,790	8.76	\$392,360
B. DIST	\$5.20	16,600	\$86,320	11.20	\$966,784
F. TOTAL		19,586	\$131,110		\$1,359,144

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)	\$0.00
(1). DISCOUNT FACTOR (TABLE A)	9.10
(2). DISTILLATE HANDLING COST (.0603*2B)	\$1,000.98
(3). DISCOUNTED SAVINGS/COST ((3A+3A2)*3A1)	\$9,108.92
B. NON RECURRING SAVINGS/COST NONE	
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) COST (-) (3A3+3B)	\$9,108.92
D. NON ENERGY DISCOUNTED SAVINGS IS = OR < 25% OF TOTAL	

4. FIRST YEAR DOLLAR SAVINGS

(2F3+3A+(3B/ECONOMIC LIFE)) \$131,110.00

5. TOTAL NET DISCOUNTED DOLLAR SAVINGS (2F5+3C)

\$1,368,253.00

6. DISCOUNT SAVINGS RATIO (IF < 1 PROJECT
DOES NOT QUALIFY) (SIR) = (5/1F)

1.51

LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION AND MANAGEMENT PROGRAM (ECAM)

LOCATION: I.N.A.A.P. REGION NO.: 5 PROJECT NUMBER: 5915330-51
PROJECT TITLE: ENERGY SAVING OPPORTUNITY SURVEY FISCAL YEAR: 91
DISCRETE PORTION NAME: ALL SIRS > 1 (R.O.C) B: SIRST1.XXX
ANALYSIS DATE: 12/86 ECONOMIC LIFE: 15 PREPARED BY: CMW

1. INVESTMENT

A. CONSTRUCTION COST	\$2,806,692.00
B. SICH (1A * 5.5%)	\$154,368.10
C. DESIGN COST (1A * 6%)	\$168,401.50
D. ENERGY CREDIT CALC (1A+1B+1C) * 90%	\$2,816,515.00
E. SALVAGE VALUE	\$0.00
F. TOTAL INVESTMENT (1D-1E)	\$2,816,515.00

2. ENERGY SAVINGS (+) / COST (-)

BASE YEAR ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

	UNIT COST SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED
FUEL	\$/MBTU(1) MBTU/YR(2)	SAVINGS(3)	FACTOR(4)	SAVINGS(5)
A. ELEC	\$15.00 33,193	\$497,899	8.76	\$4,361,593
B. DIST	\$5.20 100,611	\$523,176	11.20	\$5,859,573
F. TOTAL	133,804	\$1,021,075		\$10,221,170

3. NON ENERGY SAVINGS (+) / COST (-)

A. ANNUAL RECURRING (+/-)		\$0.00
(1). DISCOUNT FACTOR (TABLE A)	9.10	
(2). DISTILLATE HANDLING COST (.0603*2B)		\$6,066.83
(3). DISCOUNTED SAVINGS/COST ((3A+3A2)*3A1)		\$55,208.17
B. NON RECURRING SAVINGS/COST		
NONE		
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+) COST (-) (3A3+3B)		\$55,208.17
D. NON ENERGY DISCOUNTED SAVINGS IS = OR < 25% OF TOTAL		

4. FIRST YEAR DOLLAR SAVINGS

(2F3+3A+(3B/ECONOMIC LIFE)) \$1,021,075.00

5. TOTAL NET DISCOUNTED DOLLAR SAVINGS (2F5+3C)

\$10,276,370.00

6. DISCOUNT SAVINGS RATIO (IF < 1 PROJECT
DOES NOT QUALIFY) (SIR) = (5/1F)

3.65

This Energy Savings Opportunity Survey is merely the beginning of a second phase of INAAP's energy saving initiative. It is a tool to be manipulated by the staff of ICI Americas, Inc. and the Corps of Engineers.

Because of the computer program's flexibility and user friendly style, the study should be, and will be, modified and altered on a daily basis. The key to the computer program as an aid, is its ability to easily be updated and changed as buildings change and initiatives are implemented.

Hopefully, ten years from the date of this writing, INAAP will have accomplished another 32.5% reduction.

SUMMARY OF BUILDINGS IN GROUP 1:
(ALL LCCA'S WITH AN SIR > 3, AND A CONSTRUCTION COST > 5000)

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
223-7	Box Storehouses	Roof Insulation	8093	3.72	4.50
228-1	Ballistic Lab	Attic Insulation	18527	3.96	4.20
703	Admin. Building	Reduce Air Flow	30105	3.13	3.60
713	Gen. Storehouse	Wall Insulation	6024	7.48	2.20
716-2	Garage Repair	Roof Insulation	8103	3.58	4.60
716-2	Garage Repair	Attic Insulation	6548	5.54	3.00
717	Combined Shop	Night Set back Installation	5243	13.26	0.80
717	Combined Shop	Attic Insulation	27022	5.54	3.00
717	Combined Shop	Ceiling Fans	6322	10.85	1.71
1501	Store Warehouse	Roof Insulation	11587	10.51	1.60
1502	Store Warehouse	Roof Insulation	11624	10.51	1.60
1503	Store Warehouse	Glass Reduction	5474	3.78	4.40
1511	Store Warehouse	Roof Insulation	29506	7.09	2.30
1511	Store Warehouse	Ceiling Fans	5268	8.82	11.11
1511	Store Warehouse	Glass Reduction	5474	5.59	3.00
1516	Store Warehouse	Roof Insulation	11624	7.77	2.10
1524	Store Warehouse	Roof Insulation	11624	7.01	2.40
1526	Liner Mfg. Ware- house	Ceiling Fans	5268	17.85	0.96
2503	Heating Plant	Waste Heat Recovery	30105	3.27	5.10
2533	Change House LL 5 & 6	Roof Insulation	12418	4.06	4.10
2534	Change House LL 7 & 8	Roof Insulation	12418	3.55	4.70

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
2535	Change House LL 1 & 2	Roof Insulation	12418	3.22	5.20
2541	Central Heating	Waste Heat Recovery	60210	4.59	3.60
2558	Maintenance	Roof Insulation	11922	10.06	1.60
2558	Maintenance	Wall Insulation	13289	3.16	5.30
3004	Bag Load Bldg.	Roof Insulation	5894	19.33	0.90
3005	Bag Load Bldg.	Roof Insulation	5894	22.50	0.70
3006		Roof Insulation	5894	21.80	0.70
3009	Bag Load Bldg.	Roof Insulation	5894	6.65	2.00
3009	Bag Load Bldg.	Wall Insulation	20513	3.19	4.50
3011	Bag Load Bldg.	Roof Insulation	5894	6.42	2.00
3011	Bag Load Bldg.	Wall Insulation	20513	3.12	4.50
3012	Bag Load Bldg.	Roof Insulation	5894	21.78	0.70
3013	Bag Load Bldg.	Roof Insulation	5894	20.28	0.80
3014	Bag Load Bldg.	Roof Insulation	5894	6.53	2.10
3014	Bag Load Bldg.	Wall Insulation	20513	3.51	4.20
3015	Bag Load Bldg.	Roof Insulation	5894	5.72	2.30
3016	Bag Load Bldg.	Roof Insulation	5894	21.67	0.70
3019-A	Lap LL-9	Roof Insulation	11425	3.38	4.90
3402	Canteen & Boiler House	Waste Heat Recovery	25088	10.63	1.50
3403	Canteen & Boiler House	Waste Heat Recovery	25088	3.83	4.00
3405	Canteen & Boiler House	Attic Insulation	5664	3.38	3.50

SUMMARY OF BUILDINGS IN GROUP 2
(ALL LCCA'S WITH AN SIR > 3, AND A CONSTRUCTION COST >1,000,
BUT < 5000)

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
003-C		Landscape Shading	1004	7.48	2.20
005-C		Landscape Shading	1004	7.48	2.20
007-A		Landscape Shading	1204	11.12	1.50
009-C		Landscape Shading	1004	9.20	1.80
010-C		Landscape Shading	1004	11.58	1.40
011-C		Landscape Shading	1004	9.81	1.70
012-C		Landscape Shading	1204	10.11	1.60
013-C		Landscape Shading	1204	9.60	1.70
018-C		Landscape Shading	1004	9.81	1.70
019-B		Landscape Shading	1004	12.19	1.40
020-A		Landscape Shading	1004	10.41	1.60
021-B		Landscape Shading	1004	11.53	1.40
026-D		Landscape Shading	1204	10.11	1.60
027-D		Landscape Shading	1004	9.81	1.70
029-D		Landscape Shading	1204	10.11	1.60
031-D		Landscape Shading	1004	10.97	1.50
033-B		Landscape Shading	1004	12.75	1.30
034-B		Landscape Shading	1004	10.41	1.60
035-C		Landscape Shading	1405	6.61	2.50
038-E		Landscape Shading	1204	11.08	1.50
047-E		Landscape Shading	1004	9.24	1.80

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
049-E		Landscape Shading	1004	10.41	1.60
223-7	Box Storehouses	Ceiling Fans	1532	6.43	3.07
228-1	Ballistic Lab.	Night Set Back Installation	3312	17.57	0.60
228-1	Ballistic Lab.	Storm Windows	3060	3.36	4.90
702	Telephone Xchg.	Duty Cycle Control	1505	5.33	1.80
703-A	Temp. Boiler	Boiler Trim Control	3512	18.30	0.90
703-B	Temp. Boiler	Boiler Trim Control	3512	12.42	1.30
708-1	Cafeteria	Night Set Back Installation	1004	19.34	0.60
708-1	Cafeteria	Ceiling Fans	2183	5.39	3.80
708-1	Cafeteria	Glass Reduction	2837	8.37	1.30
709-1	Fire Hdqtrs.	Night Set Back Installation	2509	3.86	2.90
709-1	Fire Hdqtrs.	Storm Windows	2106	4.33	3.80
709-1	Fire Hdqtrs.	Attic Insulation	1525	4.55	3.60
709-1	Fire Hdqtrs.	Radiator Control	1656	8.10	1.40
709-1	Fire Hdqtrs.	Glass Reduction	1702	9.00	1.30
713	Gen. Storehouse	Roof Insulation	1995	59.69	0.30
713	Gen. Storehouse	Attic Insulation	1613	85.38	0.20
716-2	Garage Repair	Night Set Back Installation	1656	15.93	0.70
716-2	Garage Repair	Weatherstripping/ Caulking	1377	3.79	4.40
716-2	Garage Repair	Ceiling Fans	1505	9.64	1.93

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
716-2	Garage Repair	Glass Reduction	3985	6.62	1.70
717	Combined Shop	Storm Windows	4989	3.58	4.60
717	Combined Shop	Weatherstripping/ Caulking	1606	3.16	5.30
718	Locomotive Shop	Storm Windows	3791	3.58	4.60
718	Locomotive Shop	Roof Insulation	3999	3.58	4.60
718	Locomotive Shop	Attic Insulation	3231	5.54	3.00
719-1	Hosp. & Employ.	Landscape Shading	2534	8.03	1.40
1001	Bag Mfg.	Energy Conserva- tion Lighting	4962	5.78	1.90
1001-A	Temp. Boiler Shelter	Replacement Burner	2208	3.35	3.30
1011	Locker Rm. & Cafeteria	Energy Conserva- tion Lighting	1269	5.79	1.90
1501	Store Warehouse	Ceiling Fans	1989	9.15	2.06
1502	Store Warehouse	Ceiling Fans	1989	9.15	2.05
1516	Store Warehouse	Ceiling Fans	1989	12.07	1.51
1524	Store Warehouse	Ceiling Fans	1989	9.15	2.05
2501	Administration	Energy Conserva- tion Lighting	2305	5.79	1.90
2503	Heating Plant Control	Boiler Trim	3512	22.71	0.70
2532	Security	Solar Water Heater	4516	10.98	1.00
2532	Security	Ceiling Fans	1505	8.59	2.20
2532	Security	Glass Reduction	2935	6.23	2.70
2533	Change House LL 5 & 6	Duty Cycle Control	2459	3.20	2.70

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
2533	Change House LL 5 & 6	Replacement Burner	2007	35.60	0.30
2533	Change House LL 5 & 6	Landscape Shading	2208	13.62	0.80
2534	Change House LL 7 & 8	Duty Cycle Control	2459	3.13	2.80
2534	Change House LL 7 & 8	Replacement Burner	2208	29.40	0.40
2534	Change House LL 7 & 8	Landscape Shading	1806	16.65	0.70
2535	Change House LL 1 & 2	Replacement Burner	1004	57.34	0.20
2535	Change House LL 1 & 2	Landscape Shading	2007	14.99	0.80
2541	Central Heating	Boiler Trim Control	1004	222.85	0.10
2558	Maintenance	Replacement Burner	2007	72.32	0.20
2558	Maintenance	Boiler Trim Control	3512	3.01	5.50
2561	Combined Shops	Energy Conserva- tion Lighting	1109	5.79	1.90
2571	Welding Shop	Roof Insulation	1595	9.20	1.80
2591	Lab & Inspection	Landscape Shading	1204	13.43	0.80
2601	First Aid	Duty Cycle Control	1054	3.33	2.60
2601	First Aid	Landscape Shading	1405	13.23	0.90
3004	Bag Load Bldg.	Attic Insulation	4763	25.03	0.70
3004	Bag Load Bldg.	Landscape Shading	1405	13.62	0.80
3005	Bag Load Bldg.	Attic Insulation	4763	28.95	0.50

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
3005	Bag Load Bldg.	Weatherstripping/ Caulking	3808	7.22	1.70
3005	Bag Load Bldg.	Landscape Shading	1405	10.81	1.10
3006		Attic Insulation	4763	28.08	0.60
3006		Weatherstripping/ Caulking	3808	6.13	2.10
3006		Landscape Shading	1405	16.01	0.70
3009	Bag Load Bldg.	Attic Insulation	4763	9.45	1.40
3009	Bag Load Bldg.	Weatherstripping/ Caulking	3808	7.87	1.60
3009	Bag Load Bldg.	Landscape Shading	1405	16.74	0.70
3011	Bag Load Bldg.	Attic Insulation	4763	9.00	1.50
3011	Bag Load Bldg.	Weatherstripping/ Caulking	3808	6.57	1.80
3011	Bag Load Bldg.	Landscape Shading	1405	14.86	0.80
3012	Bag Load Bldg.	Attic Insulation	4763	28.00	0.60
3012	Bag Load Bldg. Caulking	Weatherstripping/ Caulking	3808	8.29	1.50
3012	Bag Load Bldg.	Landscape Shading	1405	8.44	1.30
3013	Bag Load Bldg.	Attic Insulation	4763	26.15	0.60
3013	Bag Load Bldg. Caulking	Weatherstripping/ Caulking	3808	6.57	2.10
3013	Bag Load Bldg.	Landscape Shading	1405	12.52	0.90
3014	Bag Load Bldg.	Attic Insulation	4763	9.58	1.50
3014	Bag Load Bldg.	Weatherstripping/ Caulking	3808	9.58	1.40
3014	Bag Load Bldg.	Landscape Shading	1405	13.28	0.90

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
3015	Bag Load Bldg.	Attic Insulation	4763	8.18	1.70
3015	Bag Load Bldg.	Weatherstripping/ Caulking	3808	8.40	1.60
3015	Bag Load Bldg.	Landscape Shading	1405	10.13	1.10
3016	Bag Load Bldg.	Attic Insulation	4763	27.92	0.60
3016	Bag Load Bldg.	Weatherstripping/ Caulking	3808	6.11	2.10
3016	Bag Load Bldg.	Landscape Shading	1405	11.85	1.00
3018-A	Bag Load LL-1	Energy Conserva- tion Lighting	1710	5.77	2.00
3019-A	Lap LL-9	Night Set Back Installation	2760	8.16	1.40
3019-A	Lap LL-9	Duty Cycle Control	3512	14.65	0.60
3019-A	Lap LL-9	Duty Cycle Control	1695	4.93	3.40
3019-A	Lap LL-9	Ceiling Fans	2164	3.52	6.63
3019-A	Lap LL-9	Landscape Shading	2208	16.56	0.70
3019-B	Support Wing	Duty Cycle Control	2459	16.61	0.50
3019-B	Support Wing	Landscape Shading	1606	15.20	0.70
3402	Canteen & Boiler House	Boiler Control	4014	136.70	0.10
3403	Canteen & Boiler House	Roof Insulation	2670	6.15	1.80
3403	Canteen & Boiler House	Roof Insulation	2158	7.75	1.50
3405	Canteen & Boiler House	Boiler Control	3011	24.76	0.60
3407	Canteen & Boiler House	Boiler Control	3011	4.32	3.80

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
3408	Canteen & Boiler House	Boiler Control	1004	47.42	0.30
3604	Ship & Cont. 2-B	Roof Insulation	2610	4.82	3.40
3604	Ship & Cont. 2-B	Attic Insulation	2109	6.85	2.40
3609	Ship & Cont. 5-A	Roof Insulation	2217	4.82	3.40
3609	Ship & Cont. 5-A	Attic Insulation	1791	6.85	2.40
3611	Ship & Cont. 5-B	Roof Insulation	2217	6.59	2.50
3611	Ship & Cont. 5-B	Attic Insulation	1791	9.36	1.80
3612	Ship & Cont. 6-A	Roof Insulation	2217	7.09	2.30
3612	Ship & Cont. 6-A	Attic Insulation	1791	10.08	1.60
3613	Ship & Cont. 6-B	Roof Insulation	2217	6.59	2.50
3613	Ship & Cont. 6-B	Attic Insulation	1791	9.36	1.80
4003	Ign. Loading 2-A	Weatherstripping/ Caulking	1139	3.79	4.40
4003	Ign. Loading 2-A	Radiator Control	2559	15.26	0.70
4004	Ign. Loading 2-B	Weatherstripping/ Caulking	1139	3.62	4.60
4004	Ign. Loading 2-B	Wall Insulation	1957	3.04	5.50
4004	Ign. Loading 2-B	Radiator Control	2559	16.10	0.70
4402	Ign. Canteen & Boiler	Night Set Back Installation	2760	3.94	2.80
4402	Ign. Canteen & Boiler	Roof Insulation	4418	4.28	3.90
4402	Ign. Canteen & Boiler	Attic Insulation	3570	6.07	2.70
4913	Black Powder Dump & Dry	Landscape Shading	1204	15.50	0.70

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
4914	Black Powder Dump & Dry	Landscape Shading	1004	18.60	0.60
4951	Black Powder Canteen & Boiler	Replacement Burner	1806	5.59	2.00
5405	Boiler House For Crating	Wall Insulation	1007	3.40	4.90

SUMMARY OF BUILDINGS IN GROUP 3
(ALL LCCA'S WITH AN SIR > 1, BUT < 3; AND A CONSTRUCTION COST > 5000)

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
223-7	Box Storehouses	Wall Insulation	12787	1.93	8.60
228-1	Ballistic Lab	Roof Insulation	22928	2.31	7.20
228-1	Ballistic Lab	Wall Insulation	33691	1.96	8.40
404-1	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-2	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-3	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-4	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-5	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-6	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
404-7	Ranney Wells	Hi-Eff. Motors	10035	1.78	6.30
703	Admin. Bldg.	Roof Insulation	24686	2.00	8.30
703	Admin. Bldg.	Insulate Heat Pipes	5018	1.00	16.60
703	Admin. Bldg.	Reduce Outside Air Quantity	19568	1.22	9.20
703-A	Temp. Boiler	Waste Heat Recovery	30105	2.64	6.30
703-B	Temp. Boiler	Waste Heat Recovery	30105	1.79	9.30
708-1	Cafeteria	Roof Insulation	11651	2.09	8.00
716-2	Garage Repair	Wall Insulation	10193	1.81	9.20
717	Combined Shop	Wall Insulation	26253	1.81	9.10
718	Locomotive Shop	Wall Insulation	13017	1.83	9.10
1001	Bag Mfg.	Roof Insulation	188000	1.01	16.90

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
1011	Locker Room & Cafeteria	Roof Insulation	41907	2.75	6.00
1021	Dye House & Laundry	Roof Insulation	19422	2.31	7.20
1501	Store Warehouse	Wall Insulation	16475	2.54	6.50
1501	Store Warehouse	Infrared Heaters	16974	1.49	7.50
1502	Store Warehouse	Wall Insulation	16370	2.54	6.50
1502	Store Warehouse	Infrared Heaters	20156	1.50	7.50
1502	Store Warehouse	Ceiling Fans	5268	1.78	9.30
1503	Store Warehouse	Storm Windows	9161	1.42	11.70
1503	Store Warehouse	Wall Insulation	41786	1.05	15.70
1503	Store Warehouse	Ceiling Fans	5268	2.80	9.29
1511	Store Warehouse	Wall Insulation	35975	1.71	9.70
1511	Store Warehouse	Load Dock Seals	6300	1.01	17.30
1524	Store Warehouse	Wall Insulation	16475	1.24	13.40
2521	Fire Station	Roof Insulation	7332	2.40	6.90
2521	Fire Station	Wall Insulation	8664	1.95	8.50
2525	Can Renovation	Storm Windows	6196	1.38	12.00
2525	Can Renovation	Roof Insulation	29804	1.38	12.00
2532	Security	Roof Insulation	10336	2.43	6.80
2532	Security	Wall Insulation	14799	1.28	12.90
2533	Security	Wall Insulation	14989	1.19	13.90
2534	Security	Wall Insulation	14957	1.21	13.70
2535	Security	Wall Insulation	14905	1.10	15.10

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
2541	Central Heating	Condensate Return	250875	1.50	11.10
2551	Garage/Trailer Repair	Wall Insulation	23787	1.03	16.10
2558	Maintenance	Replacement Boiler	20070	1.12	14.80
2561	Combined Shops	Storm Windows	6924	1.45	11.50
2561	Combined Shops	Wall Insulation	28419	1.08	15.40
2591	Lab & Inspection	Wall Insulation	7379	1.59	10.50
2601	First Aid	Wall Insulation	12200	1.01	16.70
2642	Club House	Wall Insulation	5125	1.26	13.20
3004	Bag Load Bldg.	Wall Insulation	20513	2.12	7.80
3005	Bag Load Bldg.	Wall Insulation	20513	1.84	9.00
3006	Bag Load Bldg.	Wall Insulation	20513	2.80	5.30
3012	Bag Load Bldg.	Wall Insulation	20513	2.98	4.80
3013	Bag Load Bldg.	Wall Insulation	20513	2.55	5.90
3015	Bag Load Bldg.	Wall Insulation	20513	2.86	5.10
3016	Bag Load Bldg.	Wall Insulation	20513	2.77	5.40
3018-A	Bag Load LL-1	Roof Insulation	13561	1.51	11.00
3019-B	Support Wing	Roof Insulation	6358	2.82	5.90
3019-D	Palletizing	Roof Insulation	6408	2.47	6.70
3402	Canteen & Boiler House	Wall Insulation	6645	2.90	4.10
3403	Canteen & Boiler House	Wall Insulation	6435	2.64	4.30
3405	Canteen & Boiler House	Roof Insulation	7009	2.63	4.50

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
3405	Canteen & Boiler House	Waste Heat Recovery	25088	1.79	7.90
3405	Canteen & Boiler House	Wall Insulation	12264	1.52	7.70
4402	Ign. Canteen & Boiler	Wall Insulation	8973	1.02	16.30

SUMMARY OF BUILDINGS IN GROUP 4
(ALL LCCA'S WITH AN SIR > 1, BUT < 3; AND A CONSTRUCTION COST > 1000
BUT < 5000)

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
001-C	Residence	Solar Water Heater	4516	1.03	10.90
001-C	Residence	Replacement Boiler	2007	1.38	12.00
002-C	Residence	Solar Water Heater	4516	1.12	10.10
002-C	Residence	Replacement Boiler	2007	1.09	15.20
003-C	Residence	Solar Water Heater	4516	1.12	10.10
003-C	Residence	Replacement Boiler	2007	1.27	13.10
004-C	Residence	Solar Water Heater	4516	1.02	11.00
004-C	Residence	Replacement Boiler	2007	1.38	12.00
004-C	Residence	Landscape Wind- break	1004	1.46	11.40
005-C	Residence	Landscape Wind- break	1004	1.33	12.50
007-A	Residence	Solar Water Heater	4516	1.00	11.20
007-A	Residence	Landscape Wind- break	1254	1.22	13.60
008-B	Residence	Replacement Boiler	2007	1.03	16.10
008-B	Residence	Landscape Wind- break	1254	1.17	14.20
009-C	Residence	Replacement Boiler	2007	1.00	16.60

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
009-C	Residence	Landscape Wind-break	1129	1.26	13.20
010-C	Residence	Landscape Wind-break	1254	1.06	15.60
011-C	Residence	Replacement Boiler	1950	1.01	16.70
011-C	Residence	Landscape Wind-break	1129	1.18	14.10
012-C	Residence	Landscape Wind-break	1254	1.06	15.60
013-C	Residence	Landscape Wind-break	1129	1.18	14.10
014-C	Residence	Landscape Wind-break	1129	1.02	16.30
015-B	Residence	Solar Water Heater	4516	1.12	10.10
016-C	Residence	Solar Water Heater	4516	1.12	10.10
016-C	Residence	Replacement Boiler	2007	1.25	13.30
016-C	Residence	Landscape Wind-break	1129	1.18	14.10
017-C	Residence	Solar Water Heater	4516	1.29	8.70
018-C	Residence	Landscape Wind-break	1004	1.24	13.40
021-B	Residence	Solar Water Heater	4516	1.07	10.50
021-B	Residence	Solar Water Heater	1129	1.15	14.40
022-C	Residence	Solar Water Heater	4516	1.03	11.00
023-C	Residence	Solar Water Heater	4516	1.03	11.00

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
024-B	Residence	Replacement Boiler	2007	1.15	14.40
025-B	Residence	Landscape Wind- break	1129	1.34	12.40
027-D	Residence	Solar Water Heater	4516	1.39	8.10
027-D	Residence	Replacement Boiler	2007	1.56	10.60
027-D	Residence	Landscape Wind- break	1129	1.13	14.60
028-B	Residence	Replacement Boiler	2007	1.10	15.10
028-B	Residence	Landscape Wind- break	1129	1.44	11.50
030-C	Residence	Replacement Boiler	2007	1.07	15.50
030-C	Residence	Landscape Wind- break	1200	1.02	16.80
032-B	Residence	Landscape Wind- break	1505	1.04	15.90
033-B	Residence	Landscape Wind- break	1004	1.51	11.00
034-B	Residence	Replacement Boiler	2007	1.06	15.70
034-B	Residence	Landscape Wind- break	1004	1.62	10.30
035-C	Residence	Solar Water Heater	4516	1.03	11.00
036-A	Residence	Landscape Wind- break	1004	1.47	11.30
037-F	Residence	Solar Water Heater	4516	1.10	10.30

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
037-F	Residence	Insulate Heat Pipes	2509	1.14	14.60
037-F	Residence	Replacement Boiler	2007	1.81	9.20
037-F	Residence	Landscape Wind- break	1129	1.79	9.30
223-7	Box Storehouses	Landscape Wind- break	1380	1.64	10.10
702	Telephone Xchg.	Roof Insulation	1544	1.06	15.60
702	Telephone Xchg.	Attic Insulation	1248	1.98	8.40
709-1	Fire Hdqtrs.	Roof Insulation	1888	2.59	6.40
716-2	Garage Repair	Storm Windows	4972	2.87	5.80
1001	Bag Mfg.	Glass Reduction	4303	2.65	6.30
1001	Bag Mfg.	Load Dock Seals	3087	1.74	9.50
1001-A	Temp. Boiler Shelter	Wall Insulation	2442	2.39	6.90
1001-A	Temp. Boiler Shelter	Boiler Automatic Blowdown	3512	2.75	6.00
1011	Locker Room & Cafeteria	Load Dock Seals	2315	1.16	14.30
1031-A	Walk Between 1001 & 1011	Roof Insulation	1490	2.19	7.60
1031-B	Walk Between 1001 & 1021	Roof Insulation	1490	2.69	6.20
1501	Store Warehouse	Glass Reduction	1873	2.74	6.10
1502	Store Warehouse	Glass Reduction	1873	2.70	6.10
1503	Store Warehouse	Insulate Heat Pipes	3211	2.24	7.40
1508	Store Warehouse	Glass Reduction	1873	2.53	6.50

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
1511	Store Warehouse	Energy Conserva- tion Lighting	1000	1.01	11.40
1516	Store Warehouse	Insulate Heat Pumps	1957	1.04	15.90
1524	Store Warehouse	Insulate Heat Pumps	1806	1.13	14.70
2521	Fire Station	Insulate Heat Pumps	1769	2.21	7.50
2521	Fire Station	Landscape Wind- break	1505	1.04	16.00
2532	Security	Storm Windows	4917	2.91	5.70
2532	Security	Insulate Heat Pumps	1532	1.13	14.70
2533	Change House	Boiler Trim Control	3512	1.45	11.40
2534	Change House	Boiler Trim Control	3512	1.24	13.30
2535	Change House	Boiler Trim Control	3512	1.10	15.00
2551	Garage/Trailer Repair	Glass Reduction	3993	1.43	11.60
2551-A	Paint Shop	Wall Insulation	1634	1.26	13.20
2558	Maintenance	Storm Windows	3989	1.94	8.60
2558	Maintenance	Insulate Heat Pipes	1867	1.89	8.80
2561	Combined Shops	Insulate Heat Pipes	1680	2.27	7.30
2561	Combined Shops	Ceiling Fans	3433	2.13	14.80
2561	Combined Shops	Chiller A/C Replacement	4136	1.89	8.80

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
2571	Welding Shop	Wall Insulation	4275	2.22	7.50
3004	Bag Load Bldg.	Weatherstripping/ Caulking	3808	2.53	6.60
3018-B	Intermediate LL-1	Roof Insulation	1809	1.51	11.00
3018-C	Prop. Rec. LL-1	Roof Insulation	2622	2.30	7.20
3019-C	Prop. Rec.	Roof Insulation	2012	2.47	6.70
3019-F	Bulk Prop. Gallery	Roof Insulation	4164	1.95	8.50
3019-G	Chg. Conveyor Gallery	Roof Insulation	3278	1.95	8.50
3418	Heating Plant LL-1	Replacement Burner	2208	1.87	6.00
3418	Heating Plant LL-1	Boiler Automatic Blowdown	3512	1.29	12.90
3702	Line Foreman Office	Wall Insulation	1555	1.55	10.70
3703	Line Foreman Office	Wall Insulation	1555	1.55	10.70
3705	Line Foreman Office	Wall Insulation	1555	1.54	10.80
3705	Line Foreman Office	Wall Insulation	1555	1.54	10.80
3705	Line Foreman Office	Solar Films	1555	1.54	10.80
3706	Line Foreman Office	Wall Insulation	1555	1.54	10.80
3707	Line Foreman Office	Wall Insulation	1555	1.59	10.40
3708	Line Foreman Office	Wall Insulation	1555	1.55	10.70

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
3804	Toilet Bldg. Prop. LN 2B	Wall Insulation	1957	1.55	10.70
3805	Toilet Bldg. Prop. LN 3A	Wall Insulation	1957	1.55	10.70
3806	Toilet Bldg. Prop. LN 3B	Wall Insulation	1957	1.54	10.80
3809	Toilet Bldg. Prop. LN 5B	Wall Insulation	1957	1.57	10.60
3811	Toilet Bldg. Prop. LN 5B	Wall Insulation	1957	1.54	10.80
3812	Toilet Bldg. Prop. LN 6A	Wall Insulation	1957	1.55	10.70
3813	Toilet Bldg. Prop. LN 6B	Wall Insulation	1957	1.55	10.70
3814	Toilet Bldg. Prop. LN 7A	Wall Insulation	1957	1.60	10.40
3815	Toilet Bldg. Prop. LN 7B	Wall Insulation	1957	1.59	10.50
3816	Toilet Bldg. Prop. LN 8A	Wall Insulation	1957	1.50	11.00
4003	Ign. Loading 2-A	Night Set Back Installation	3036	2.77	4.00
4003	Ign. Loading 2-A	Wall Insulation	1957	2.94	5.60
4004	Ign. Loading 2-B	Night Set Back Installation	3312	2.55	4.40
4402	Ign. Canteen & Boiler	Storm Windows	1822	2.02	8.20
4403	Ign. Canteen & Boiler	Storm Windows	1203	2.10	7.90
4403	Ign. Canteen & Boiler	Wall Insulation	3502	1.02	16.30

<u>BUILDING #</u>	<u>BUILDING NAME</u>	<u>ECO DESCRIPTION</u>	<u>\$ INV.</u>	<u>SIR</u>	<u>SIMPLE PAYBACK</u>
4403	Ign. Canteen & Boiler	Glass Reduction	3424	1.10	10.30
4602	Ign. Foreman Office & Canteen	Wall Insulation	1198	1.55	10.70
5403	Toilet for Crating	Wall Insulation	2138	1.40	11.90
6602	Disposal Sewer Plant	Wall Insulation	2883	1.31	12.70

APPENDIX A

Listing of Buildings Included in
The ESOS Study

AREA 1, P&E: 223-1 - 223-8 (BOX STOREHOUSES)
228-1 (BALLISTIC LAB.)
264 (POWDER DUMP HOUSE)
402-3 - 402-6 (RESERVOIR PUMP & DRINKING WATER)
404-1 - 404-7 (RANNEY WELLS)
607-1 (PUMP STATION)
607-2 (CHLOR. BUILDING)
608 (DIG. TANK & WASTE GAS)
610 (PUMPING STATION)
6001 (WELL & HOUSE)
6001-A (PUMP STATION)
6002 (WELL & HOUSE)
6002-A (PUMP HOUSE)
6017 (PUMP HOUSE WITH RESERVOIR)
707-4 (CHANGE HOUSE)
707-5 (CHANGE HOUSE)
709-1 (FIRE HEADQUARTERS)
713 (GENERAL STOREHOUSE)
715-1 (OIL & PAINT STORAGE)
715-2 (OIL & PAINT STORAGE)
716-2 (GARAGE REPAIR)
716-2A (TEMPORARY BOILER)
717 (COMBINED SHOP)
718 (LOCOMOTIVE SHOP)
719-1 (HOSPITAL & EMPLOYMENT)
720 (GUARD HEADQUARTERS)
722-26 (AREA SHOP)

AREA 2, LAP: 2533 (CHANGE HOUSE LL 5 & 6)
2534 (CHANGE HOUSE LL 7 & 8)
2535 (CHANGE HOUSE LL 1 & 2)
2631-4 (SPRINKLER VALVE HOUSE)
2631-5 (SPRINKLER VALVE HOUSE)
2631-6 (SPRINKLER VALVE HOUSE)
2631-9 (SPRINKLER VALVE HOUSE)
2631-10 (SPRINKLER VALVE HOUSE)
2631-11 (SPRINKLER VALVE HOUSE)
2631-12 (SPRINKLER VALVE HOUSE)
2631-13 (SPRINKLER VAVLE HOUSE)
2631-14 (SPRINKLER VAVLE HOUSE)
2631-15 (SPRINKLER VAVLE HOUSE)
2631-19 (SPRINKLER VAVLE HOUSE)
3004 (BAG LOAD BUILDING)
3005 (BAG LOAD BUILDING)
3009 (BAG LOAD BUILDING)
3011 (BAG LOAD BUILDING)
3012 (BAG LOAD BUILDING)
3013 (BAG LOAD BUILDING)
3014 (BAG LOAD BUILDING)
3015 (BAG LOAD BUILDING)
3016 (BAG LOAD BUILDING)
3018-A (BAG LOAD LL-1)
3018-B (INTERMEDIATE LL-1)
3018-C (PROP. REC. LL-1)
3018-D (SHIPPING LL-1)
3018-E (GALLERY LL-1)
3018-G (GALLERY LL-1)
3019-A (LAP LL-9)
3019-B (SUPPORT WING)
3019-C (PROP. REC.)
3019-D (PALLETIZING)
3019-E (COVERED WALK LL-9)
3019-F (BULK PROP. GALLERY)
3019-G (CHG. CONVEYOR GALLERY)
3019-J (A/C PLANT)
3019-L (AIR COOL HEAT X-CHG.)
3019-M (PRIMARY FEEDER)
3402 (CANTEEN & BOILER HOUSE)
3403 (CANTEEN & BOILER HOUSE)
3405 (CANTEEN & BOILER HOUSE)
3407 (CANTEEN & BOILER HOUSE)
3408 (CANTEEN & BOILER HOUSE)
3418 (HEATING PLANT LL-1)
3419 (HEATING PLANT LL-9)
3604 (SHIP. & CONT. 2-B)
3609 (SHIP. & CONT. 5-A)
3611 (SHIP. & CONT. 5-B)
3612 (SHIP. & CONT. 6-A)
3613 (SHIP. & CONT. 6-B)

3912 (FATIGUE HOUSE 6-A)
3702 (LINE FOREMAN OFFICE)
3703 (LINE FOREMAN OFFICE)
3705 (LINE FOREMAN OFFICE)
3706 (LINE FOREMAN OFFICE)
3707 (LINE FOREMAN OFFICE)
3708 (LINE FOREMAN OFFICE)
3804 (TOILET BLDG. PROP. LN. 2B)
3805 (TOILET BLDG. PROP. LN. 3A)
3806 (TOILET BLDG. PROP. LN. 3B)
3806 (TOILET BLDG. PROP. LN. 5A)
3809 (TOILET BLDG. PROP. LN. 5B)
3811 (TOILET BLDG. PROP. LN. 5B)
3812 (TOILET BLDG. PROP. LN. 6A)
3813 (TOILET BLDG. PROP. LN. 6B)
3814 (TOILET BLDG. PROP. LN. 7A)
3815 (TOILET BLDG. PROP. LN. 7B)
3816 (TOILET BLDG. PROP. LN. 8A)
3822 (TOILET SHIP./CONT. BLDG. 2B)
3827 (TOILET SHIP./CONT. BLDG. 5A)
3828 (TOILET SHIP./CONT. BLDG. 5B)
3829 (TOILET SHIP./CONT. BLDG. 6A)
3831 (TOILET SHIP./CONT. BLDG. 6B)
3904 (FATIGUE HOUSE 2-B)
3905 (FATIGUE HOUSE 3-A)
3906 (FATIGUE HOUSE 3-B)
3909 (FATIGUE HOUSE 5-A)
3911 (FATIGUE HOUSE 5-B)
3913 (FATIGUE HOUSE 6-B)
3914 (FATIGUE HOUSE 7-A)
3915 (FATIGUE HOUSE 7-B)
3916 (FATIGUE HOUSE 8-A)
3919 (FATIGUE HOUSE @ CRATING)
3921 (FATIGUE HOUSE @ CRATING)
3922 (FATIGUE HOUSE @ CRATING)
4003 (IGN. LOADING 2-A)
4004 (IGN. LOADING 2-B)
4402 (IGN. CANTEEN & BOILER)
4403 (IGN. CANTEEN & BOILER)
4602 (IGN. FOREMAN OFFICE & CANTEEN)
4702 (FATIGUE HOUSE IGN. 2)
4901 (BLACK POWDER DUMP & DRY)
4902 (BLACK POWDER FAN & DRY)
4913 (BLACK POWDER DUMP & DRY)
4913-1 (REF/AC SOURCE DUMP & DRY)
4914 (BLACK POWDER DUMP & DRY)
4923 (BLACK POWDER TRANSFER)
4924 (BLACK POWDER TRANSFER)
4933 (BLACK POWDER TRANSFER)
4934 (BLACK POWDER TRANSFER)
4951 (BLACK POWDER CANTEEN & BOILER)
5402 (CRATING)
5403 (TOILET FOR CRATING)
5405 (BOILER HOUSE FOR CRATING)

AREA 3, INERT: 1001 (BAG MANUFACTURING)
1001-A (TEMPORARY BOILER SHELTER)
1011 (LOCKER ROOM & CAFETERIA)
1021 (DYE HOUSE & LAUNDRY)
1031-A (WALK BETWEEN 1001 & 1011)
1031-B (WALK BETWEEN 1001 & 1021)
1501 (STORE WAREHOUSE)
1502 (STORE WAREHOUSE)
1503 (STORE WAREHOUSE)
1508 (STORE WAREHOUSE)
1511 (STORE WAREHOUSE)
1516 (STORE WAREHOUSE)
1524 (STORE WAREHOUSE)
1526 (LINER MFG. WAREHOUSE)
1526-A (BOILER SHELTER)
2501 (ADMINISTRATION)
2503 (HEATING PLANT)
2521 (FIRE STATION)
2525 (CAN RENOVATION)
2532 (SECURITY)
2541 (CENTRAL HEATING)
2551 (GARAGE/TRAILER REPAIR)
2551-A (PAINT SHOP)
2558 (MAINTENANCE)
2561 (COMBINED SHOPS)
2571 (WELDING SHOP)
2586 (BATTERY RE-CHARGE)
2591 (LAB & INSPECTION)
2601 (FIRST AID)
6301 (MAIN SUB-STATION METER HOUSE)
6301-1 (SUB-STATION @ 2525)
6304 (SUB-STATION BETWEEN LL-6 & LL-7)
6602 (DISPOSAL SEWER PLANT)
6611 (PUMPING STATION)

AREA 4,

ADMINISTRATIVE:

702 (TELEPHONE EXCHANGE)
703 (ADMINISTRATION BUILDING)
703-A (TEMPORARY BOILER)
703-B (TEMPORARY BOILER)
703-C (A/C PLANT)
703-1C (ADMINISTRATION BUILDING)
708-1 (CAFETERIA)
708-3A (BOILER HOUSE)
708-3B (BOILER HOUSE)
738 (ATUODIN)

AREA 5,
RESIDENCES:

2642 (CLUB HOUSE)

TYPE A = 7, 20, 36

TYPE B = 8, 15, 19, 21, 24, 25, 28,
32, 33, 34

TYPE C = 1, 2, 3, 4, 5, 6, 9, 10, 11,
12, 13, 14, 16, 17, 18, 22,
23, 30, 35

TYPE D = 26, 27, 29, 31

TYPE E = 38, 39, 40, 41, 42, 43, 44,
45, 46, 47, 48, 49

TYPE F = 37